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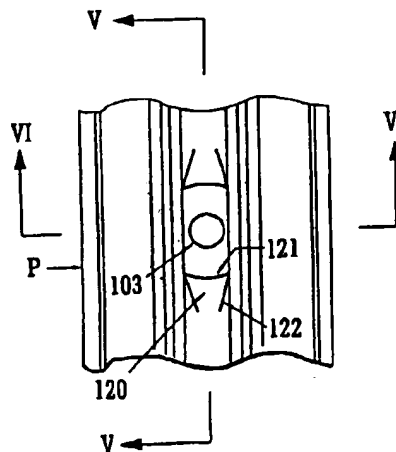
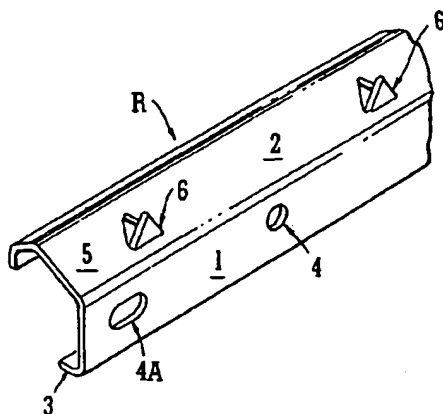
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[Continued on next page]

(54) Title: SECURITY FENCES



(57) Abstract: A rail (R) for a security fence has a slide wall (5) which extends away from a web (1) at an angle so that gap portions between the pales (P) cannot be used as a step. Spikes (6) are present. A pale (P) for a security fence has at least one hole (103) to receive a fastener (104) having a head (109) and a shank (108), with the shank (108) extending through the hole (103) and the underside of the head (109) being in contact with the surface (101) of the pale (P), wherein integral shoulder means (120) are located adjacent the or each hole (103), said shoulder means (120) being shaped to deny access to the underside of the head (109) of a so-received fastener (104), whereby the fastener (104) cannot be prised away from the pale (P).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SECURITY FENCES

The invention relates to a security fence. It is known to make such a fence to protect an establishment having say articles to be kept secure.

In one known style of fence, spaced apart metal posts called pales are secured to one or more horizontal rails between end posts. The pales may have the profile of a V, a corrugated W or corrugated D. The rail is usually an L-shaped, thick metal section and the pales are secured to the rail by bolts passed through aligned holes in the vertical leg of the rail and the pales. Typically, the pales are spaced to leave a gap of about 50 mm between them and the exposed flat surface of the other leg of the rail could be used as a step by an intruder. The rails are made of relatively thick metal sections for strength. This increases the cost of the rails.

It is a general object of the invention to provide a fence adapted to enhance its ability to act as a security fence. It is another object of the invention to provide a security fence rail having such an enhanced ability and also to provide a security fence pale having such an enhanced ability.

In one aspect the invention provides a security fence comprising generally vertical pales each secured by a bolt or the like to one side of generally horizontal rail, the pales being spaced apart along the rail with gaps in between, the rail comprising a main web and at least one side wall, the pales abutting one face of the web of the rail, the side wall extending above the web away from the rail on the side of the web remote from the pales at an angle selected so that the gap portions of the rail between pales cannot be used by an intruder as a step.

In a more specific aspect the invention provides a security fence comprising generally vertical pales each secured by a bolt or the like to a generally horizontal rail, the pales being spaced apart along the rail with gaps in between, the rail comprising a length of shaped metal section having a thickness of about 2 mm to about 4 mm, the section comprising a main web and at least one side wall which is above the main web and extends at an angle so that the gap portions of the rail between pales cannot be used by an intruder as a step.

Preferably the rail is of cold formed metal substantially channel shaped section having opposite side walls which make the rail rigid despite its thinness.

In another aspect spikes are struck up from the said at least one the upper side wall in the gaps, to act as an added deterrent to an intruder.

Preferably the pales abut the outer face of the web of the rail, and the side walls of the rail extend away from the rail on the side of the web remote from the pales.

Typically the pales extend a vertical distance above the generally horizontal rail.

The pales are secured to the rail by bolts passing through aligned holes, in the usual way.

A security fence cannot guarantee absolute security from a determined intruder. The thief may try to remove the head of the fastener by use of a sharp tool e.g. a chisel, or prise a fastener from the assembly of the pale and the rail. The thief needs to be able to get the tool behind the fastener head for this purpose.

Security fences have been proposed which address this issue, for example, those described and claimed in GB 2241721 and GB 2307493. However, each of the prior art fences requires elements additional to the pale, rail and fastener to achieve the desired result.

A further security fence, comprising posts and mesh sections has been proposed in GB 2250757. This, similarly, relies on the provision of elements additional to the posts, mesh sections and fasteners. It also discloses the use of fasteners with frangible portions to ensure the heads thereof cannot be attacked.

According to a second aspect of the invention, there is provided a security fence comprising generally vertical pales secured by bolts or the like to a generally horizontal rail, wherein a fence pale has at least one hole to receive a fastener having a head and a shank, with the shank extending through the hole and the underside of the head being in contact with the surface of the pale, wherein integral shoulder means are located adjacent the or each hole, the shoulder means being shaped to deny access to the underside of the head of a so-received fastener, whereby the fastener cannot be prised away from the pale.

The pale may be a cold-formed metal section, preferably steel, shaped to have a longitudinal web and a longitudinal wing portion extending from each side thereof, the hole and shoulder means being present in and on the web respectively.

Preferably the shoulder means comprises two shoulders on diametrically opposite sides of the or each hole, e.g. above and below the hole when the pale is vertical.

The wing portions preferably extend out of the plane of the web, such that, in co-operation with the shoulders, they deny access from every direction of the so-received fastener, in use.

Preferably each shoulder comprises a ramp portion rooted remote from the or each hole and inclined upwardly theretowards and terminating in a face portion inclined downwardly towards the or each hole.

In a third aspect the invention provides a security fence rail comprising a main web and at least one side wall, which in use, extends above the web at an angle thereto, wherein the angle is selected so that in use, the gap portions of the rail between attached pales cannot be used by an intruder as a step.

According to a fourth aspect of the invention, there is provided a security fence pale, the pale having at least one hole to receive a fastener having a head and a shank, with the shank extending through the hole and the underside of the head being in contact with the surface of the pale, characterised by integral shoulder means being located adjacent the or each hole, the shoulder means being shaped to deny access to the underside of the head of a so-received fastener, whereby the fastener cannot be prised away from the pale.

In a fifth aspect of the invention, there is provided a method of forming a pale as ust defined, the method comprising cold-rolling steel to form an elongate member having integral shoulder means and forming a hole in the member, the hole being located such that the shoulder means are adjacent thereto.

A sixth aspect of the invention provides a method of forming a pale as defined, the method comprising forming a hole in an elongate steel member and cold-rolling that member to form a pale having integral shoulder means adjacent the hole.

In order that the invention may be well understood it will now be described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a front elevation of one security fence of the invention;

Figure 2 is an end view of a rail shown in Figure 1;

Figure 3 is a perspective view from one end of another rail of the invention.

Figure 4 is a plan view of part of the length of a pale of another security fence of the invention;

Figure 5 is a section taken on lines V - V on Figure 4;

Figure 6 is a section taken on lines VI - VI of Figure 4;

Figure 7 is a partial sectional view of an assembly showing a chisel attack on a prior art pale; and

Figure 8 is a partial sectional view of an assembly showing a chisel attack on a pale according to the invention.

The security fence shown in Figures 1 to 3 comprises spaced upright parallel pales P joined to upper and lower horizontal rails R which are connected at their ends to end posts C. The pales P are spaced apart by a distance leaving gaps G in between. According to this invention the rails R are preferably formed from cold rolled metal section, typically steel, to be of general channel shape comprising a main web 1 and opposite side walls 2,3. The section is from 2 to 4 mm thick, which is almost half the usual thickness of a hot rolled steel section rail. Fastener receiving holes 4 are formed at spaced apart locations in the main web 1 by which the pales P are secured thereto and holes 4a are present at each end for connection to the end posts C. The upper side wall 2 extends at an angle to define a ramp portion 5 to deter scaling of the assembly. The other side wall 3 is relatively short and straight. The dimensions of the section are selected to provide a predetermined yield strength. As shown in Figure 3, spikes 6 are struck up from the floor of the ramp portion 5 to deter intruders from attempting to use the rail portions G as a step to gain access into the fenced area.

The pales P are cold rolled from metal section. They may be of any known shape and have fastener receiving holes.

In use, the rails R are secured between end posts C. The pales P are individually fastened onto the rail by aligning the fastening holes with the holes 4 in the rail and passing bolts B through and securing them in place by threading on nuts, not shown. The pales P are abutted against the face of the web 1 opposite to the side walls 2,3. The rail R is sufficiently rigid to withstand distortion under load.

The pale P shown in Figures 4 to 8 comprises a length of metal section, e.g. cold-rolled steel, to have a major web 101 and two side wings 102, the wings 102

extending out of the plane defined by the major web 101. Spaced-apart holes 103 (only one shown) are present in the major web 101 to receive fasteners 104 (Figure 8) by which a rail 105 is joined to a pale P. The holes 103 may be formed before or after cold rolling. The fasteners 104 are passed through the holes 103 in the pale P and an aperture 106 in the rail 105. Each fastener 104 has a nut or collar 110 to secure the assembly and hold the components P, 105 together.

According to this aspect of the invention, shoulders 120 are present on the web 101 on diametrically opposite sides of the hole 103. Each shoulder 120 is generally wedge shaped, as seen in plan, having a wider curved wall 121 near the hole 103. The wall 121 rises relatively steeply from the web 101 and then descends in a ramp portion 122 to merge with the web remote from the hole 103.

The curved shape of the hole-facing wall 121 allows that wall 121 to at least partially encompass the perimeter of a head 109 of a fastener 104.

As shown in the top half of Figure 7, where no shoulder 120 is present, a chisel C can be put behind the head 109 of the fastener 104 to remove the head 109 from the fastener 104 or, alternatively, force the fastener 104 from its collar 110 and so destroy the assembly.

In contrast, and as shown in Figure 8, the shoulders 120 prevent such an attack in a pale P of the invention. The side wings 102 act in concert with the shoulders 120 to ensure that there is no point from which a chisel C may be forced under the head 109 of the fastener 104.

CLAIMS

1. A security fence comprising generally vertical pales each secured by a bolt or the like to one side of generally horizontal rail, the pales being spaced apart along the rail with gaps in between, the rail comprising a main web and at least one side wall, the pales abutting one face of the web of the rail, the side wall extending above the web away from the rail on the side of the web remote from the pales at an angle selected so that the gap portions of the rail between pales cannot be used by an intruder as a step.
2. A fence according to Claim 1, wherein spikes are struck up from the upper sidewall in the gaps.
3. A fence according to Claim 1 or 2, wherein the pales extend a vertical distance above the horizontal rail.
4. A security fence comprising generally vertical pales each secured by a bolt or the like to one side of generally horizontal rail, the pales being spaced apart along the rail with gaps in between, the rail comprising a length of shaped metal section having a thickness of about 2 mm to about 4 mm, the section comprising a main web and at least one side wall, which is above the main web and extends at an angle so that the gap portions of the rail between pales cannot be used by an intruder as a step.
5. A security fence comprising generally vertical pales secured by a bolt or the like to a generally horizontal rail, wherein the pales have at least one hole to receive a fastener having a head and a shank, with the shank extending

through the hole and the underside of the head being in contact with the surface of the pale integral shoulder means being located adjacent the or each hole, the shoulder means being shaped to deny access to the underside of the head of a so-received fastener, whereby the fastener cannot be prised away from the pale.

6. A fence according to Claim 5, comprising a cold-formed metal section shaped to have a longitudinal web and a longitudinal side wing extending from each side thereof, the hole and shoulder means being present in and on the web respectively.
7. A fence according to Claim 5 or Claim 6, wherein the shoulder means comprises two shoulders on diametrically opposite sides of the or each hole.
8. A fence according to any of Claims 5 to 7, wherein the side wings extend out of the plane of the web, such that, in co-operation with the shoulder means, they deny access from every direction of the so-received fastener, in use.
9. A fence according to Claim 7 or Claim 8 when dependent on Claim 7, wherein each shoulder comprises a ramp portion rooted remote from the or each hole and inclined upwardly theretowards and terminating in a face portion inclined downwardly towards the or each hole.
10. A security fence rail comprising a main web and at least one side wall, which in use extends above the web at an angle thereto, wherein the angle is selected so that, in use, the gap portions of the rail between pales cannot be used by an intruder as a step.

11. A fence rail according to Claim 10, wherein spikes are struck up from the upper sidewall in the gaps.
12. A fence rail according to Claim 10 or 11, comprising a length of shaped metal section having a thickness of about 2 mm to about 4 mm.
13. A security fence pale, the pale having at least one hole to receive a fastener having a head and a shank, with the shank extending through the hole and the underside of the head being in contact with the surface of the pale, integral shoulder means being located adjacent the or each hole, the shoulder means being shaped to deny access to the underside of the head of a so-received fastener, whereby the fastener cannot be prised away from the pale.
14. A pale according to Claim 13, comprising a cold-formed metal section shaped to have a longitudinal web and a longitudinal side wing extending from each side thereof, the hole and shoulder means being present in and on the web respectively.
15. A pale according to Claim 13 or Claim 14, wherein the shoulder means comprises two shoulders on diametrically opposite sides of the or each hole.
16. A pale according to claim 13, 14 or 15, wherein the side wings extend out of the plane of the web, such that, in co-operation with said shoulder means, they deny access from every direction of the so-received fastener, in use.

17. A pale according to Claim 15 or Claim 16, wherein each shoulder comprises a ramp portion rooted remote from the or each hole and inclined upwardly theretowards and terminating in a face portion inclined downwardly towards the or each hole.
18. A method of forming a pale according to Claim 13, the method comprising cold-rolling steel to form an elongate member having integral shoulder means and forming a hole in the member, the hole being located such that said shoulder means are adjacent thereto.
19. A method of forming a pale according to Claim 13, the method comprising forming a hole in an elongate steel member and cold-rolling that member to form a pale having integral shoulder means adjacent the hole.

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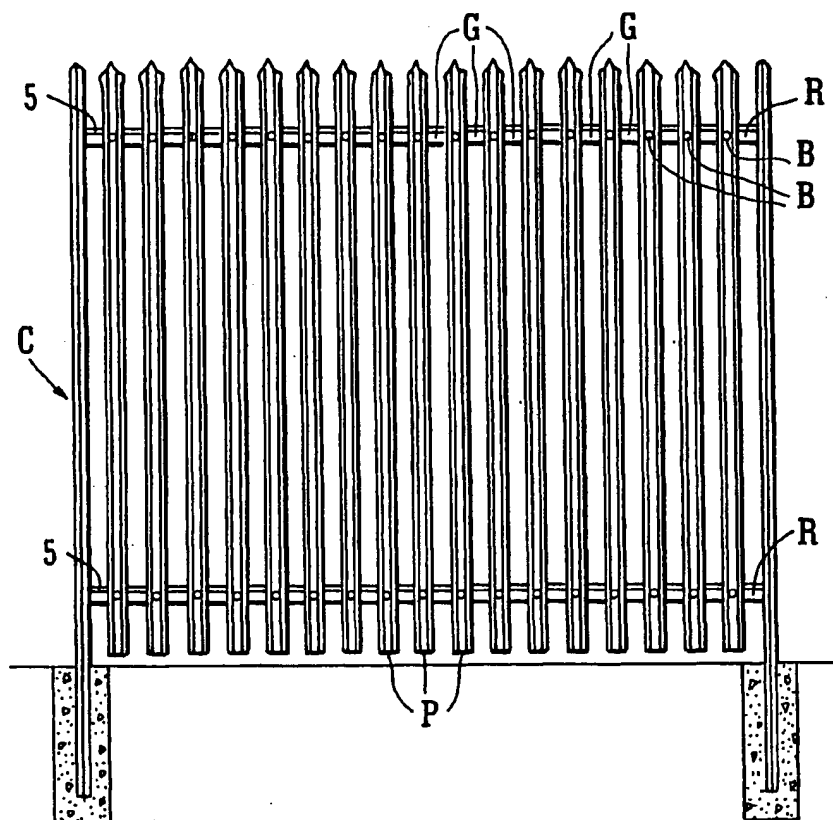


FIG. 1

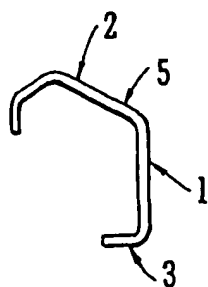


FIG. 2

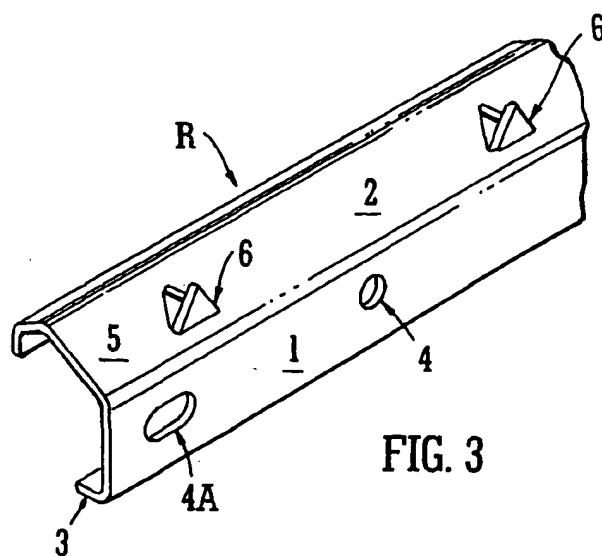


FIG. 3

2/2

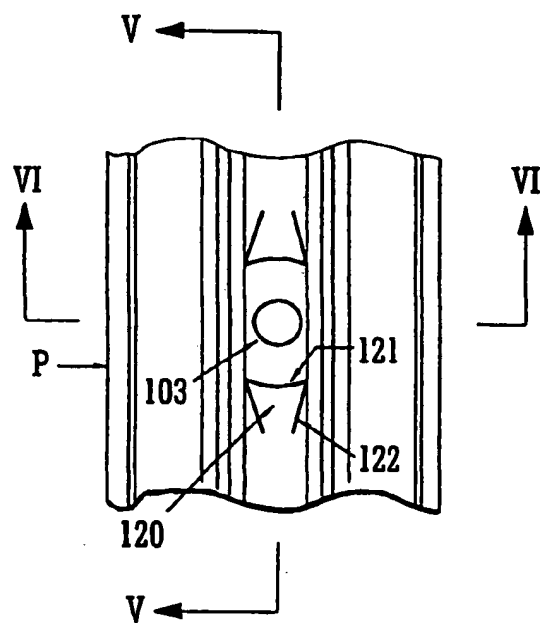


FIG. 4

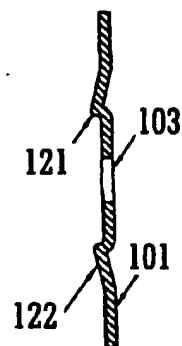


FIG. 5

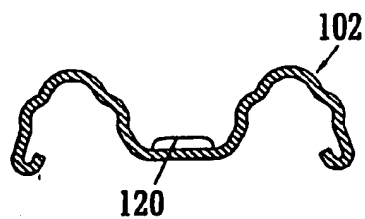


FIG. 6

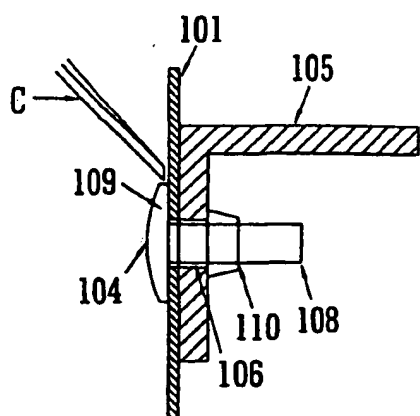


FIG. 7

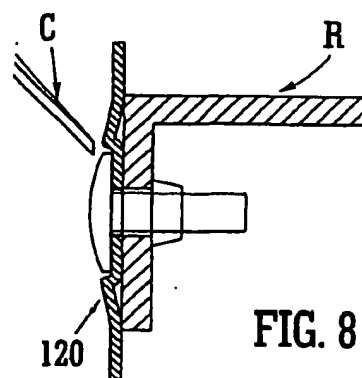


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 02/00873

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04H17/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 398 750 A (WORNUM, HOLLIES) 21 September 1933 (1933-09-21) the whole document	1,3,4,10
A	GB 2 350 846 A (HADLEY INDUSTRIES PLC) 13 December 2000 (2000-12-13) the whole document	1,3-5, 10,13
A	GB 311 111 A (HANSEN) 9 May 1929 (1929-05-09) the whole document	1,3,4,10

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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INTERNATIONAL SEARCH REPORT

In **1st** Application No
PCT/GB 02/00873

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 398750	A	21-09-1933	NONE
GB 2350846	A	13-12-2000	NONE
GB 311111	A	09-05-1929	NONE